

ATTORNEY DOCKET NO: 71084

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : ABELS et al.  
Serial No : 10/632,017  
Confirm. No : 9343  
Filed : July 31, 2003  
For : BALL-AND-SOCKET JOINT  
Art Unit : 3679  
Examiner : Ernesto Garcia  
Dated : August 31, 2006

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

APPEAL BRIEF

(1) REAL PARTY IN INTEREST.

The real party in interest is ZF Lemförder Metallwaren AG.

(2) RELATED APPEALS AND INTERFERENCES.

There are believed to be no related appeals or interferences.

(3) STATUS OF CLAIMS.

Claims 1, 5, 9, 10, 12, 14, 17, 20, 23 and 29 stand rejected under 35 U.S.C. 102(b) as being anticipated by Yao (JP 2-199317).

Claims 1 and 28 stand rejected under 35 U.S.C. 102(b) as being anticipated by Amrath (US 4,639,159).

Claims 30 and 31 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yao and further in view of Gardner (US 2,197,037).

Claims 2-4, 6-8, 11, 13, 16, 18, 19, 21 and 22 stand withdrawn from consideration.

#### (4) STATUS OF AMENDMENTS.

The amendment after final rejection filed March 7, 2006 was entered for purposes of appeal.

#### (5) SUMMARY OF THE CLAIMED SUBJECT MATTER

##### CLAIM 1:

Claim 1 is directed to a ball-and-socket joint used for wheel suspensions of motor vehicles. The ball-and-socket joint includes a housing 1 (page 7, line 17) and a bearing shell 2 (page 7, line 17) inserted into the housing 1 (Figure 10). The ball-and-socket joint further comprises a ball pivot 3 (page 7, line 16) with a joint ball 3.1 (page 7, line 16) mounted pivotally in all directions in the bearing shell 2. A sealing bellows 4 (page 8, line 2) is provided between the housing 1 and the ball pivot 3. The sealing bellows 4 has a pivot-side edge area 4.1 (page 8, line 2). A ball race 5 (page 7, lines 17-18) is fixed on the ball pivot 3. A sliding ring 6 (page 7, lines 19-20) receives the pivot-side edge area 4.1 of the sealing bellows 4. The sliding ring 6 is mounted to slide in the ball race 5 (Figures 1, 2, 5, 6, 7). The sliding ring 6 has a sliding surface 4.1 (page 8, lines 2-3) facing the joint ball 3.1 arranged adjacent to the ball race 5. The ball race 5 has a leg structure (Figure 8) that comprises lugs 5.2 arranged at spaced

locations from one another such that the leg is in contact with the sliding ring 6 (page 8, lines 4-7).

CLAIM 5:

The sliding ring 6 is specified in claim 5 to include an axial extension 6.3 (page 7, line 20 through page 8, line 1) and a radial extension 6.4 (page 7, line 20 through page 8, line 1).

CLAIM 9:

The ball race 5 is specified in claim 9 to have an approximately U-shaped cross-section (page 7, line 20).

CLAIM 10:

The sealing bellows 4 is specified in claim 10 to have a surface (page 8, lines 2-4) slidingly in contact with a surface (page 8, lines 2-4) of the ball race 5.

CLAIM 12:

The surface of the sealing bellows 4 is specified in claim 12 to contact the surface of the ball race 5 and forms a labyrinth seal 4.3, 5.1 (page 8, lines 2-5) together with the surface of the ball race 5.

CLAIM 14:

The sliding ring 6 is specified in claim 14 as a shaped sheet metal part (page 5, line 8-9) or a plastic molding (page 5, line 8-9). The sliding ring 6 receives and holds a portion of the sealing bellows 4 between the radial 6.4 and axial extensions 6.3. The radial and axial extensions are substantially perpendicular to each other (see Figure 1). The ball race 5 is fixed to the ball pivot 3.

CLAIM 17:

The pivot-side edge area 4.1 of the sealing bellows 4 is specified in claim 17 to form a thickened material bead (page 5 lines 20-21 through page 6, lines 1-2), which is pressed against the ball race 5 or the sliding ring 6 with an elastic pretension (page 5 lines 20-21 through page 6, lines 1-2).

CLAIM 20:

The sliding ring 6 is specified in claim 20 to have an approximately L-shaped cross section (page 7, lines 19-20).

CLAIM 23:

The sliding ring 6 is vulcanized (page 6, lines 9-11) directly to the pivot-side edge area 4.1 of the sealing bellows 4.

CLAIM 28:

The lugs 5.2 are in direct contact with the sliding ring 6 (Figure 1 and page 8, lines 13-14).

CLAIM 29:

Each of the lugs 5.2 is specified in claim 29 to include free ends facing away from the ball pivot 3 in a radial direction (see Figures 1 and 8).

CLAIM 30:

The sliding ring 6 is specified in claim 30 to have an L-shaped cross section (page 7, 19-20) comprising an axial leg 6.3 (page 7, line 20 through page 8, line 1) and a radial leg 6.4 (page 7, line 20 through page 8, line 1). The radial leg 6.4 is in sliding contact with an inner surface (page 8, lines 14-15) of the ball race 5.

CLAIM 31:

The radial leg 6.4 is specified in claim 31 includes the features of claim 30. The radial leg 6.4 is arranged between the sealing bellows 4 and the lugs 5.2.

(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL.

Whether claims 1, 5, 9, 10, 12, 14, 17, 20, 23 and 29 are rejectable under 35 U.S.C. 102(b) as being anticipated by Yao (JP 2-199317).

Whether claims 1 and 28 are rejectable under 35 U.S.C. 102(b) as being anticipated by Amrath (US 4,639,159).

Whether claims 30 and 31 are rejectable under 35 U.S.C. 103(a) as being unpatentable over Yao and further in view of Gardner (US 2,197,037).

(7) ARGUMENT.

ISSUE: Whether claims 1, 5, 9, 10, 12, 14, 17, 20, 23 and 29 are rejectable under 35 U.S.C. 102(b) as being anticipated by Yao (JP 2-199317).

The Yao reference discloses a seal structure of a dust cover for a ball joint. A head section 28 of a flange section 15 of a ring collar 13 (Fig. 4) that is folded in such a way that a cross section from a center section in a peripheral direction to a proper position opposite to a spherical head section side becomes a U-like character. A sealing member 27 made of plastic or rubber elasticity (elastomer) is provided between the ring collar 13 and a connecting rod 18 (Fig. 3). An elastic force of a flange section 15 of the ring collar 13 improves the sealing ability and prevents the production of a gap between the ring collar 13 and the connecting rod 18.

Yao does not show a sliding ring mounted to slide in a ball race that is fixed to the ball pivot. Yao also fails to show the combination of a ball race having a leg that is in contact with the sliding ring with the leg comprising lugs arranged at spaced locations from one another. Yao clearly fails to show a sliding ring that is in sliding contact with a ball race.

The rejection is based on the position that Yao discloses an embedded element mounted to slide in the ring collar 13. The Yao reference neither teaches nor suggests a sliding ring

mounted to slide in a ball race. Yao teaches an embedded element (labeled A1 in the rejection) shown embedded in the sealing bellows. The embedded element (A1) of the Yao reference is taken in the rejection to be equivalent to the sliding ring of the present invention, is shown embedded in the sealing bellows. Since the sealing bellows is touching at least three sides of the ring collar 13, the sealing bellows cannot slide in any ball race. Similarly, the L-shaped embedded element also cannot slide in a ball race because the element is embedded in the sealing bellows.

The present invention takes a different approach by providing a sealing bellows between a housing and a ball pivot. The sealing bellows has a pivot-side edge area. A sliding ring receives the pivot-side edge area of the sealing bellows. The sliding ring is mounted to slide in the ball race. It is unclear to the Applicant how the embedded element (labeled A1) of Yao slides within the ring collar 13 when the embedded element (A1) is surrounded nearly on all sides by the sealing bellows 8. Even if the embedded element (A1) could slide within the ring collar 13, the sealing bellows 8 would wear immediately due to the significantly high friction of the rubber contact surface. In contrast to Yao, the sliding ring of the present invention is mounted so that the sliding ring slides within the ball race, which advantageously reduces friction. This provides the advantage of compensating for movements generated in the joint with the slightest friction possible without the sealing bellows becoming worn or destroyed. It is clear that Yao fails to provide such an advantage. With any movement the sealing bellows 8 directly rubs up against the ring collar 13 generating significant friction such that the sealing bellows 8 wears out much faster and requires that the sealing bellows 8 to be more frequently

replaced. Instead of allowing relative movement, the structure of Yao prevents this, using the elastic force of flange section 15 to provide a good seal. The Yao reference clearly does not disclose that the embedded element is mounted to slide within the ring collar 13. As such, the prior art teaches a different approach and does not suggest the features or advantages of the present invention.

The Yao reference also fails to teach or suggest the combination of a ball race having a leg that is in contact with a sliding ring with the leg comprising lugs arranged at spaced locations from one another. The rejection is based on the position that the ring collar 13 has a flange section 15 that is in contact with the embedded element and that the flange section 15 comprises head section 28 arranged at spaced locations from one another. The Yao disclosure clearly teaches that the head section 28 (equivalent to lugs according to the rejection) is not in direct contact with the L-shaped embedded element (assumed to be equivalent to sliding ring in the rejection). In contrast to Yao, the present invention provides that the leg of ball race 5 (composed of the plural lugs 5.2) is in direct contact with the sliding ring 6. Additionally, the Yao reference does not disclose or suggest that the head section 28 is arranged at spaced locations from one another. At most, Yao teaches that the head section 28 of the flange section 15 of a ring collar 13 is folded in such a way that the cross section from the approximate center section in the peripheral direction to a proper position opposite to the spherical head section side becomes U-shaped. In contrast, the present invention provides a ball race having a leg that is in contact with the sliding ring with the leg comprising lugs arranged at spaced location from one another. The Yao reference fails to teach or suggest such features. As such, the prior art

teaches a different approach.

Accordingly, Applicant respectfully requests that the holding be reversed and that the rejection be removed.

ISSUE: Whether claims 1 and 28 are rejectable under 35 U.S.C. 102(b) as being anticipated by Amrath (US 4,639,159).

The Amrath reference discloses a rack steering linkage 1 wherein a bellows 4 is fastened between a rack housing 2 and a ball pin 3 in order to seal off a ball joint 5. The device for fastening the bellows 4 to the ball pin 3 comprises an annular disk 7 with a holding ring 8 arranged thereon and a wire ring 9 which holds the end of the bellows 4 in a circumferential groove 8b in the holding ring 8. The annular disk 7 has a closed outer circumferential edge 10 on which the holding ring 8 formed with a complementary inwardly opening annular groove 8a that can be snap-fastened, as well as inwardly extending segments 12 separated from each other by slots 11. The inside diameter of the disk 7, which is defined by the inner ends of the segments 12, is smaller than the outside diameter of the ball pin 3 on which the disk 7 is to be fastened. For this reason, the segments 12 are bent alternatively in opposite directions out of the plane of the edge 10 and then impart to the disk 7 the inwardly open bell-shaped form. In order to facilitate mounting, the inner ends of the segments 12 can be provided on one side with inwardly bent mounting flanges 13 or else with outwardly bent mounting flanges 14 which are slightly bent upwards.

The Amrath reference fails to teach or suggest a sliding ring mounted to slide in a ball

race. The Amrath reference does not disclose that the holding ring 8 is able to slide relative to the disk 7. At most, Amrath teaches a holding ring 8 arranged on an annular disk 7 for fastening the bellows 4 to the ball pin 3 and a wire ring 9 which holds the end of the bellows 4 in a circumferential groove 8b in the holding ring 8. The present invention takes a different approach by providing a sealing bellows between a housing and a ball pivot. The sealing bellows has a pivot-side edge area. A sliding ring receives the pivot-side edge area of the sealing bellows. In contrast to the Amrath disclosure, the sliding ring of the present invention is able to slide relative to the ball race. The Amrath disclosure fails to teach or suggest that the holding ring 8 slides relative to the annular disk 7. As such, these teachings suggest a different approach and do not suggest the features of the invention.

Appellant asks that the decision rejecting the claims be reversed and be set aside as the prior art as a whole fails to suggest features from the independent claim. Absent teachings and suggestions in the prior art to direct the person of ordinary skill in the art toward the features of the present invention, the rejection should be considered untenable and the claims should be considered patentable as presented.

ISSUE: Whether claims 30 and 31 are rejectable under 35 U.S.C. 103(a) as being unpatentable over Yao and further in view of Gardner (US 2,197,037).

As previously discussed, the Yao reference does not teach or suggest the present invention. Specifically, Yao fails to disclose a sliding ring mounted to slide in the ball race and a ball race having a leg comprising lugs spaced apart from each other. Although Gardner

teaches a ring 23 made in two interfitting sections that are sleeved together, the references as a whole fail to suggest the combination of features claimed. Specifically, the Gardner reference fails to teach or suggest a sliding ring mounted to slide in a ball race and lugs spaced apart from each other. The references do not suggest the invention and therefore all claims define over the prior art as a whole. Thus, the combination of features are not made obvious by the two references. Applicant also notes that there must be some suggestion or teaching in the prior art as a whole which would lead the person of ordinary skill in the art to provide the combination as claimed. As such, these teachings suggest a different approach and do not suggest the features of the invention. As the prior art as a whole fails to direct the person of ordinary skill in the art toward the claimed combination, the invention should not be considered obvious.

Appellant asks that the decision rejecting the claims be reversed and be set aside as the prior art as a whole fails to suggest features from each of the independent claims. Absent teachings and suggestions in the prior art to direct the person of ordinary skill in the art toward the combination claimed, the rejection should be considered untenable and the claims should be considered patentable as presented.

Respectfully submitted  
for Appellant,

A handwritten signature in black ink, appearing to read 'J. McGlew', with a stylized flourish extending to the right.

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- and -



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JJM:BMD

71084-17

Attached: Claims Appendix

DATED: August 31, 2006  
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SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE  
IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-  
0410.

## (8) CLAIMS APPENDIX

1. A ball-and-socket joint, comprising:

a housing;

a bearing shell inserted into said housing;

a ball pivot with a joint ball mounted pivotally in all directions in said bearing shell;

5 a sealing bellows between the housing and the ball pivot, said sealing bellows having a pivot-side edge area;

a ball race fixed on said ball pivot; and

a sliding ring receiving said pivot-side edge area of said sealing bellows, said sliding ring being mounted to slide in said ball race, said sliding ring having a sliding surface facing the joint  
10 ball arranged adjacent to the ball race, wherein said ball race has a leg which is in contact with said sliding ring, said leg comprising lugs arranged at spaced locations from one another.

5. A joint in accordance with claim 1, wherein:

said sliding ring includes an axial extension and a radial extension.

9. A ball-and-socket joint in accordance with claim 1, wherein:

said ball race has an approximately U-shaped cross section.

10. A ball-and-socket joint in accordance with claim 1, wherein:

said sealing bellows has a surface slidingly in contact with a surface of said ball race.

12. A ball-and-socket joint in accordance with claim 10, wherein:

said surface of said sealing bellows which is in contact with said surface of said ball race forms a labyrinth seal together with said surface of said ball race.

14. A ball-and-socket joint in accordance with claim 5, wherein:

said sliding ring is a shaped sheet metal part or a plastic molding;

said sliding ring receives and holds a portion of said sealing bellows between said radial and axial extensions;

5       said radial and axial extensions are substantially perpendicular to each other;

said ball race is fixed to said ball pivot.

17. A ball-and-socket joint in accordance with claim 1, wherein:

said pivot-side edge area of said sealing bellows forms a thickened material bead, which is pressed against said ball race or said sliding ring with an elastic pretension.

20. A ball-and-socket joint in accordance with claim 1, wherein:

said sliding ring has an approximately L shaped cross section.

23. A ball-and-socket joint in accordance with claim 1, wherein:

said sliding ring is vulcanized directly to said pivot-side edge area of said sealing

bellows.

28. A ball-and-socket joint in accordance with claim 1, wherein said lugs are in direct contact with said sliding ring.

29. A ball-and-socket joint in accordance with claim 1, wherein each of said lugs include free ends facing away from said ball pivot in a radial direction.

30. A ball-and-socket joint in accordance with claim 1, wherein said sliding ring has an L-shaped cross section comprising an axial leg and a radial leg, said radial leg being in sliding contact with an inner surface of said ball race.

31. A ball-and-socket joint in accordance with claim 30, wherein said radial leg is arranged between said sealing bellows and said lugs.

(9) Evidence appendix

NONE

(10) Related proceedings appendix (new)

NONE